

PROPORTION-AIR

MIZAIR®

Installation and Maintenance

U.S. Patent #7,517,199 (Additional Patents Pending)

Description

The Proportion-Air, Inc. MizAir® is a revolutionary device that is specifically designed to reduce air consumption of Air Operated Double Diaphragm (AODD) Pumps. Its unique air delivery management allows for the reduction of air consumption by up to 50% with minimal loss of fluid flow. The only requirement from the user of the MizAir is a 24VDC power source and to ensure the MizAir is close coupled to the pump. The MizAir utilizes a micro controller controlled air dispensing system. The MizAir consists of a high-flow normally-open two-way valve and an electronic control unit. The high-flow normally-open valve delivers precisely timed pulses of air to the pump at the beginning of each pump stroke. The MizAir valve then closes before the pump finishes its stroke. The air that has already entered the pump and has started the pump stroke is left to continue expanding and finish the stroke. This results in the pump ending its stroke with less air entering the pump for a given amount of fluid being pumped. Since less air enters, there is less air to exhaust as well. This helps the pump start its next cycle because there is less resistance to the return stroke. Less exhaust also produces lower exhaust noise levels.



The MizAir utilizes an internal pressure sensor to monitor the air being supplied to the pump. The characteristics of this pressure signal allow the MizAir's micro controller to determine where the pump is in its stroke. This information is used to time the pulses of air entering the pump. The MizAir is an intelligent device and is able to continuously monitor the speed and operating parameters of the pump and make adjustments to the valve timing as needed.

The valve is designed and built by Proportion-Air, Inc. to meet the demanding requirements of diaphragm pump control. The MizAir has a fast response time (<30ms), low power consumption (<275mA @ 24Vdc) and high cycle life (more than 25 million cycles). The result is a lightweight, compact, anodized aluminum two-way valve which is mounted directly to our control circuit in a NEMA 4X rated assembly which is ideally suited to the kinds of environments in which diaphragm pumps are often installed.

SPECIFICATIONS

ELECTRICAL

POWER REQUIREMENT 24 VDC (+/-0.2 VDC)

WORKING SUPPLY CURRENT 275mA

TEMPERATURE 32-122°F (0-50°C)

AMBIENT TEMPERATURE 32-158°F (0-70°C)

MECHANICAL

MAXIMUM INLET PRESSURE 130 PSIG

RESPONSE TIME <30 ms

PHYSICAL

WEIGHT 2.7 lbs. (1.13 Kg)

HOUSING RATING NEMA4x/IP65

SHOCK RATING 25 G's of Force

END CONNECTIONS (PORT SIZE) 3/4" NPT Cv - 6

WETTED MATERIALS Buna-N, Anodized Aluminum, Nickel Plated Aluminum, Stainless Steel

Installation *Before you get started please read these warnings:*

1. Examine the product. Ensure that you received what you ordered.
2. Read this guide first before you start and save it for later use.
3. Carefully read the installation manual for the diaphragm pump that you will be installing the MizAir on and follow all of the pump manufacturer's safety precautions.
4. All compressed air and electrical power should be shut off before installing, removing or performing maintenance on the MizAir.
5. Installation and use of this product should be under the supervision and control of properly qualified personnel in order to avoid the risk of injury or death.

Mounting

1. Mount the MizAir as close as possible to the supply air port of the pump. A quality galvanized steel or stainless steel pipe nipple is recommended. The longer the distance from the pump to the MizAir, the less savings are possible. A 3/4" NPT pipe nipple 6" long would be typical.
2. The outlet/work port (labeled "O" on MizAir) is connected to the supply air port of the pump.
3. Connect supply air (up to 125 psig) to the Inlet/Supply port (labeled "I" on the MizAir). This line should be flexible and mounted so as to avoid strain on the MizAir. This supply line must be sized to avoid starving the MizAir and pump. For pumps with 3/4" NPT inlet ports, use 3/4" NPT pipe and pipe fittings and/or 1" hose sizes.
4. A gauge may be installed in either of the two 1/8" NPT gauge ports of the MizAir. This will aid in observing the MizAir operation and troubleshooting. The gauge must have a range equal to or larger than the maximum supply pressure to the MizAir. A glycerin filled gauge is recommended.
5. If a pressure reducing regulator is used in the supply airline to the MizAir, the regulator will need to be mounted as far upstream from the MizAir as allowable by the installation. Pressure reducing regulators do not respond well to the rapid cyclical changes in air flow. Pressure lead/lag and harmonics can cause the MizAir to see erroneous air pressure signals, preventing the MizAir from operating properly. Twenty feet or more upstream is a typical range.
6. Other restrictions in the air supply should also be minimized. Maximum reductions will be achieved by MizAir when unrestricted air flow is supplied. Small piping filters or partially open ball valves can all restrict the flow enough to prevent MizAir from providing the critical, high-volume, initial thrust to start the diaphragm pump's stroke.

Electrical Connections Required

1. The MIZAIR requires 24 VDC power at 275mA to operate.
2. Locate the six pin G-Series Hirschmann Connector shown in Figure 1. A field wireable mating connector (H615) is included with each MIZAIR. The color code refers to Proportion-Air preassembled cables (QBT-C-x).
3. Connect 24 VDC positive to pin #6 and DC Common to pin #1 (refer to Figure 2).

Electrical Connections Optional

1. Pin #2 (blue) may be used for monitoring or data collection purposes (refer to figures 3 & 4). During typical operation, time "t" will vary between 200mS and 800mS of duration. The time at 24VDC represents the time the MizAir is flowing air to the pump. Since air is added once per stroke, this signal represents one pump stroke and can be used as a pump stroke counter.
2. Pin #5 (red) may be used to monitor the pressure between the MizAir and the pump (refer to figure 5). This is the same pressure as is displayed on the gauge shown on the dimension drawing (last page). This signal is analog 0 to 4.1VDC = 0 to 120PSIG. This signal is the output of an operational amplifier. Load resistance should be greater than 1500 Ohms.

6 Pin Hirschmann Connector

Pin#	Color	Description
1	GREEN	DC COMMON
2	BLUE	STROKE COUNTER
3	BROWN	N/C
4	WHITE	PUMP DISABLE
5	RED	OUTPUT PRESSURE
6	BLACK	24VDC (+)

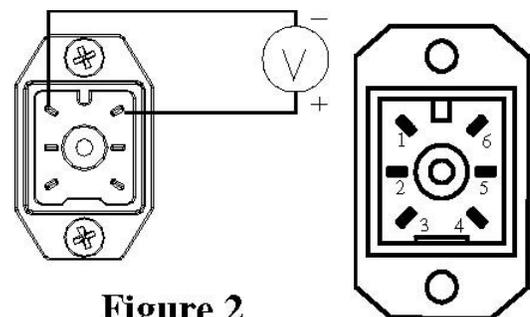


Figure 2

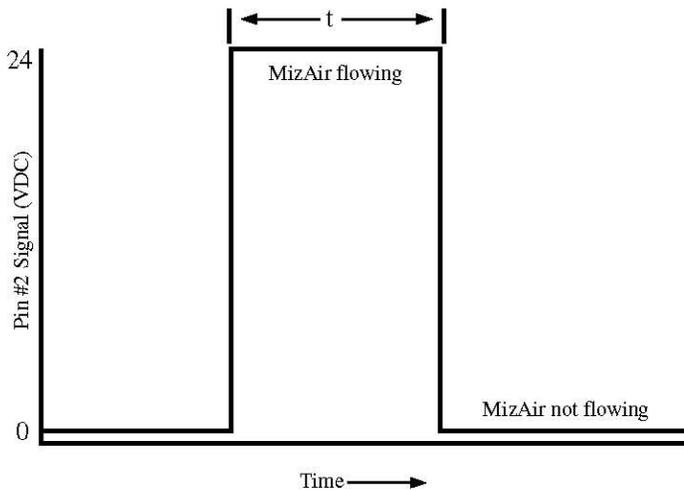


FIGURE 3 (Stroke counter connection)

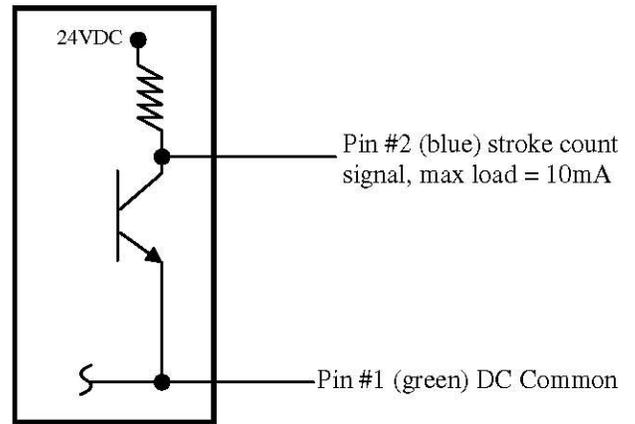


FIGURE 4 (Stroke counter pulse output)

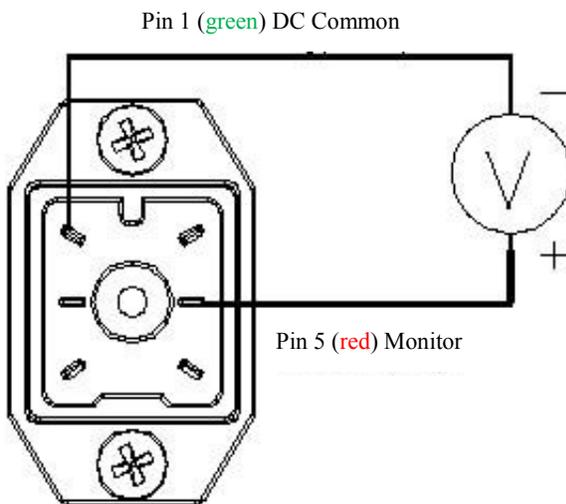


FIGURE 5 (Pressure signal monitor connection)

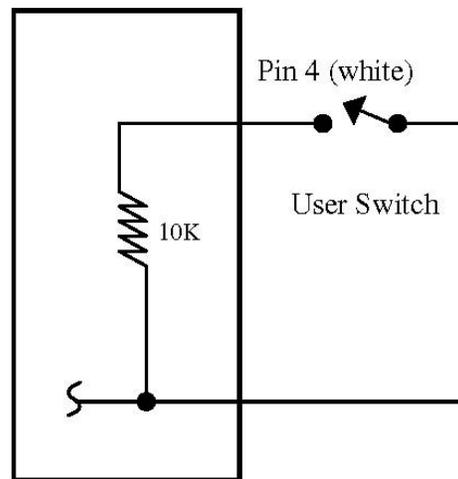
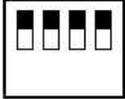
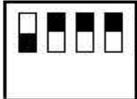
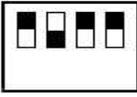
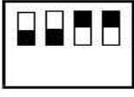
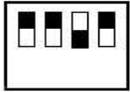
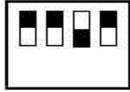
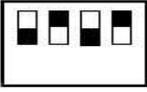
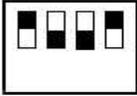
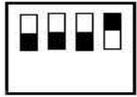
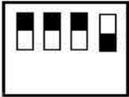
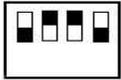


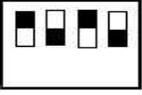
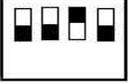
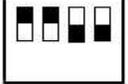
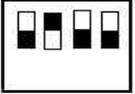
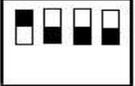
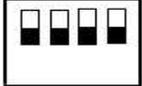
FIGURE 6 (Switch to force the MizAir valve into a closed position)

Dip Switch Settings

1. The DIP switches are used to select the code for the micro controller appropriate to the pump model, size and equipment being used.
2. The DIP switches are located beneath the rubber oval access cap. To access the DIP switches remove the rubber access cap.
3. The closest switch to the internal wiring connector is #1 and the furthest is #4.
4. Once selected, no further DIP switch changes should be required unless the MizAir is moved to a different size or model of pump.
5. Select the pump model, size and equipment below to obtain the correct DIP switch setting.
6. If your pump model and/or size is not shown on the chart, please contact the factory. Your pump may not be compatible.
7. The MizAir code is generally robust enough to allow you to set the DIP switch to a pump size and diaphragm close to what you have. Savings may not be optimized, but overall pump compatibility may be determined. **DO NOT ADJUST THE TWO LOWER CALIBRATION POTS WITH YELLOW TBRQWZ SEAL ON THEM, THESE ARE FACTORY SET ONLY.**
8. Replace oval when finished and rubber cap.

DIP SWITCH SETTINGS

Pump#	Description	Switch Settings	
0	Most 3" pumps including Wilden and Ingersoll Rand	All up in raised position	
1	Wilden 2" Rubber Diaphragm	Switch #4 down, all others up	
2	Wilden 2" Teflon Diaphragm	Switch #3 down, all others up	
3	New Pump (N/A)	switch 3 & 4 down, all others up	
4	Versa-Matic 2"	switch 2 down, all others up	
5	N/A	switch 2 down, all others up	
6	Wilden 2" Stainless Steel	switch #2 & #4 down all others up	
7	Graco Husky 2150	switch 2 down & 3 down, all others up	
8	Ingersoll Rand PA30 Teflon Diaphragm	switch 1 up, all others down	
9	Ingersoll Rand PA20 Rubber Diaphragm	switch 1 down, all others up	
10	Ingersoll Rand 666250 Santoprene Diaphragm	switch #1 & #4 down all others up	

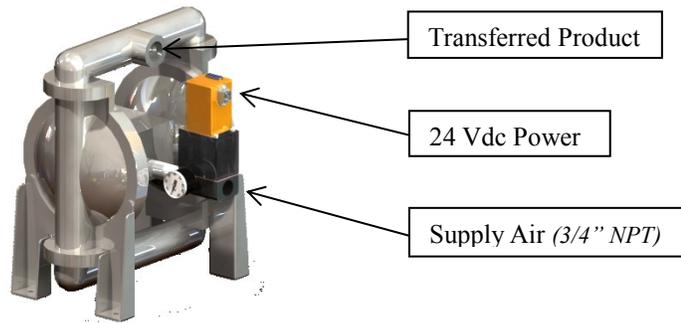
Pump#	Description	Switch Settings	
11	Ingersoll Rand 666250 Teflon Diaphragm	Switch #1 & #3 down all others up	
12	Sandpiper 3”	Switch #1 & #3 & #4 down, #2 up	
13	N/A	switch 1 & switch 2 down, all others up	
14	Yamada XDP-50	Switch #1 & #2 & #4 down, #3 up	
15	Yamada XDP-80	Switch #1 & #2 & #3 down, #4 up	
16	N/A	All switches down	

Determining the Software Version

1. Remove the oval rubber access cap.
2. Apply 24VDC electrical power to the MizAir. If 24VDC is already present, momentarily break the power connection.
3. Inside the MizAir are many LED's. Observe the yellow one. The sequence is long flashes separated by three quick flashes.
4. Example; On power up if the yellow LED flashes: LONG-LONG-quick-quick-quick-LONG-quick-quick-quick-LONG-LONG-LONG-quick-quick-quick This sequence would indicate software code version 2.1.3
5. The yellow LED is also useful as a trouble shooting tool. This LED is regularly asked by the software to blink once about every 2 seconds. If the yellow LED is not flashing every 2 seconds this would indicate there is a problem.

Operation

1. As long as the MizAir has 24 VDC power and the pump is running the MizAir is operating.
2. The MizAir adjusts its operation as supply air pressure, pump head, pump speed, and other parameters change.
3. If the pump stalls, or output flow is stopped, the MizAir will supply full pressure to the pump until the pump re-starts. The MizAir will then resume operation.
4. Observing a pressure gauge installed in the MizAir gauge port will allow observation of the rhythmic cyclical output from the MizAir. This steady regular pattern of pressure displayed by the gauge is useful in determining that the MizAir is operating properly.
- 5.
6. The MizAir is a normally open valve. Removing 24 VDC power from the MizAir will cause the MizAir to open fully. This allows the pump to operate without the air savings as if the MizAir was not present.



Icing

A diaphragm pump extracts work from the compressed air supplied to it. This, and the subsequent expansion when the air is exhausted, causes the air to exit the pump at a lower than ambient temperature. Often this is below the freezing point of water and causes ice formation. This is a normal consequence of AODD pumps.

1. The exhaust air of a diaphragm pump will be much colder when using the MizAir. You are obtaining the same amount of work with less air, so the air exits colder.
2. Temperatures of -40°F are not uncommon inside the internal exhaust passages of a diaphragm pump using the MizAir.
3. These low temperatures cause two potential problems. First, is that the cold causes the moisture in the airstream to condense and ice forms in the exhaust passages and muffler system. Drying the air is often ineffective as the dew point required is so low. Second, is the change in dimensions of the moving components of the valve internal to the pump (due to thermal contraction). Internal valves with tight tolerances, such as lapped spool valves, are susceptible to stalling, galling and abrasion. This isn't really "icing" but rather a pump design which is not compatible with the cold temperatures produced by the MizAir.
4. If the pump being used has icing issues without the MizAir, it will be worse with the MizAir.
5. Our experience shows that using a high tolerance internal valve design (i.e. with sealing rings taking up the tolerances) is most likely to be compatible with the MizAir. Using oversized exhaust mufflers (better heat sink) or piping the exhaust away usually resolves icing.

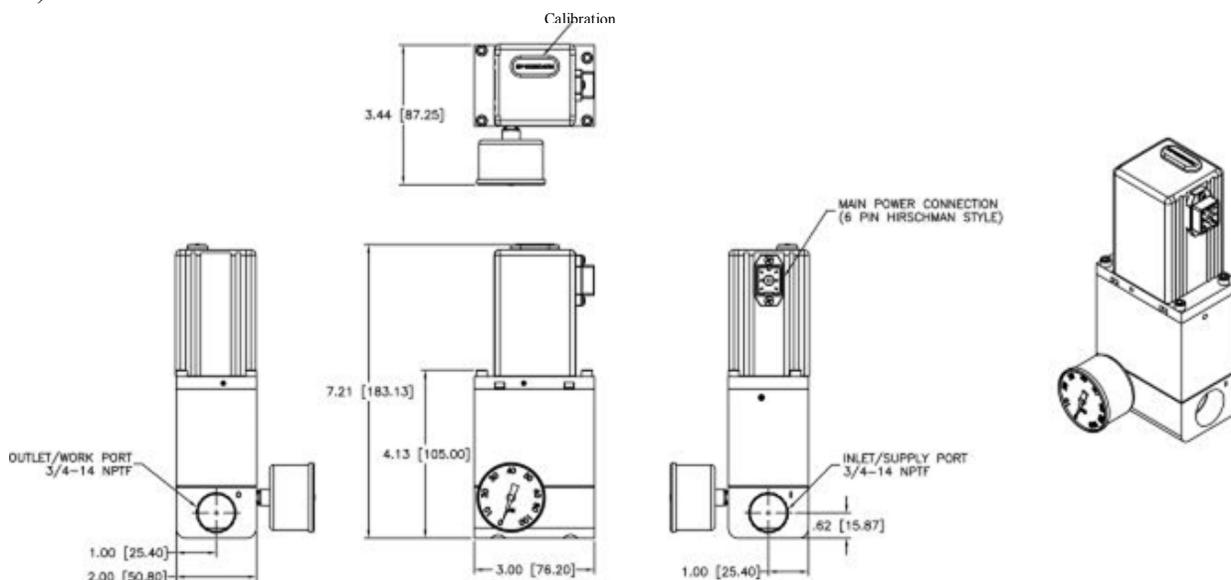
Stalling

The MizAir reduces energy consumption by leaving the diaphragm pump with less air at the end of the stroke. Consequently, there is less air available to shift the main valve inside the pump. Pump designs which do not have durable "anti-stall" internal valves which prevent the valve from stopping in a center off position or on the "off" stroke side generally are not compatible with the MizAir. Pumps which have a mechanical reset button on the main valve are most likely to display this problem.

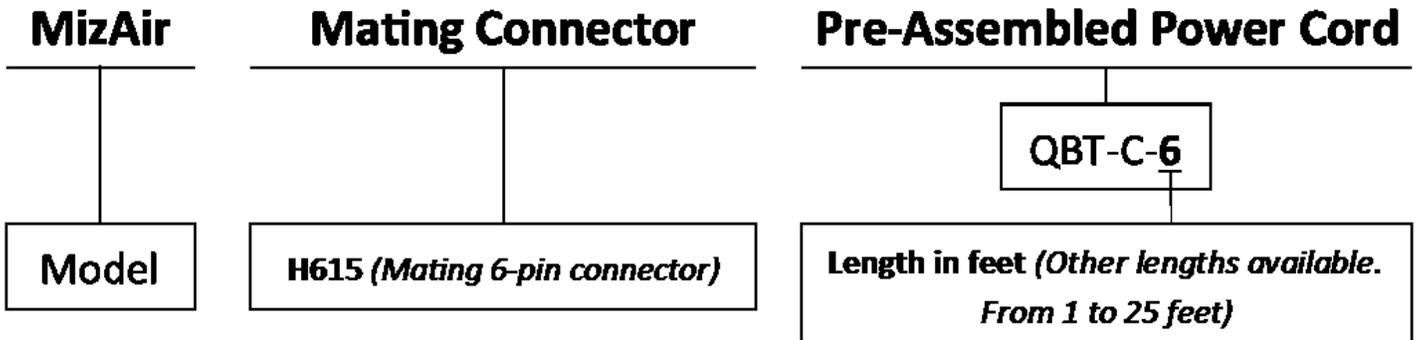
Dimensions

DIMENSIONS ARE FOR REFERENCE USE ONLY

Inches (mm)



ORDERING INFORMATION



PROPORTION-AIR, INC.

P.O. BOX 218 MCCORDSVILLE, IN USA 46055

Phone: (317) 335-2602 Fax: (317) 335-3853

www.proportionair.com info@proportionair.com

www.MizAir.com



Please read all of the following Safety Precautions before installing or operating any Proportion-Air, Inc. equipment or accessories. To confirm safety, be sure to observe 'ISO 4414: Pneumatic Fluid Power - General rules relating to systems' and other safety practices.



Warning

Improper operation could result in serious injury to persons or loss of life!

1. PRODUCT COMPATIBILITY

Proportion-Air, Inc. products and accessories are for use in industrial pneumatic applications with compressed air media. The compatibility of the equipment is the responsibility of the end user. Product performance and safety are the responsibility of the person who determined the compatibility of the system. Also, this person is responsible for continuously reviewing the suitability of the products specified for the system, referencing the latest catalog, installation manual, Safety Precautions and all materials related to the product.

2. EMERGENCY SHUTOFF

Proportion-Air, Inc. products cannot be used as an emergency shutoff. A redundant safety system should be installed in the system to prevent serious injury or loss of life.

3. EXPLOSIVE ATMOSPHERES

Products and equipment should not be used where harmful, corrosive or explosive materials or gases are present. Unless certified, Proportion-Air, Inc. products cannot be used with flammable gases or in hazardous environments.

4. AIR QUALITY

Clean, dry air is not required for Proportion-Air, Inc. products. However, a 40 micron particulate filter is recommended to prevent solid contamination from entering the product.

5. TEMPERATURE

Products should be used with a media and ambient environment inside of the specified temperature range of 32°F to 158°F. Consult factory for expanded temperature ranges.

6. OPERATION

Only trained and certified personnel should operate electronic and pneumatic machinery and equipment. Electronics and pneumatics are very dangerous when handled incorrectly. All industry standard safety guidelines should be observed.

7. SERVICE AND MAINTENANCE

Service and maintenance of machinery and equipment should only be handled by trained and experienced operators. Inspection should only be performed after safety has been confirmed. Ensure all supply pressure has been exhausted and residual energy (compressed gas, springs, gravity, etc.) has been released in the entire system prior to removing equipment for service or maintenance.



Caution

Improper operation could result in serious injury to persons or damages to equipment!

1. PNEUMATIC CONNECTION

All pipes, pneumatic hose and tubing should be free of all contamination, debris and chips prior to installation. Flush pipes with compressed air to remove any loose particles.

2. THREAD SEALANT

To prevent product contamination, thread tape is not recommended. Instead, a non-migrating thread sealant is recommended for installation. Apply sealant a couple threads from the end of the pipe thread to prevent contamination.

3. ELECTRICAL CONNECTION

To prevent electronic damage, all electrical specifications should be reviewed and all electrical connections should be verified prior to operation.

Exemption from Liability

1. **Proportion-Air, Inc.** is exempted from any damages resulting from any operations not contained within the catalogs and/or instruction manuals and operations outside the range of its product specifications.
2. **Proportion-Air, Inc.** is exempted from any damage or loss whatsoever caused by malfunctions of its products when combined with other devices or software.
3. **Proportion-Air, Inc.** and its employees shall be exempted from any damage or loss resulting from earthquakes, fire, third person actions, accidents, intentional or unintentional operator error, product misapplication or irregular operating conditions.
4. **Proportion-Air, Inc.** and its employees shall be exempted from any damage or loss, either direct or indirect, including consequential damage or loss, claims, proceedings, demands, costs, expenses, judgments, awards, loss of profits or loss of chance and any other liability whatsoever including legal expenses and costs, which may be suffered or incurred, whether in tort (including negligence), contract, breach of statutory duty, equity or otherwise.

Warranty

Proportion-Air, Inc. products are warranted to the original purchaser only against defects in material or workmanship for one (1) year from the date of manufacture. The extent of Proportion-Air's liability under this warranty is limited to repair or replacement of the defective unit at Proportion-Air's option. Proportion-Air shall have no liability under this warranty where improper installation or filtration occurred.

PROPORTION-AIR, INC.

8250 N. 600 West, P.O. Box 218
McCordsville, Indiana 46055

317.335.2602 | info@proportionair.com